

Equivalent Resistance Worksheet

Name: _____

1. Three resistors with values of $3.0\ \Omega$, $6.0\ \Omega$, and $12\ \Omega$ are connected in series. What is the equivalent resistance of this combination?

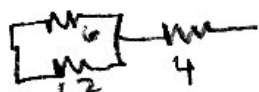
$$3 + 6 + 12$$

$$21\ \Omega$$

2. Three resistors with values of $4.0\ \Omega$, $6.0\ \Omega$, and $12.0\ \Omega$ are connected in parallel. What is their equivalent resistance?

$$\left(\frac{1}{4} + \frac{1}{6} + \frac{1}{12} \right)^{-1} \rightarrow 2\ \Omega$$

3. Two resistors with values of $6.0\ \Omega$ and $12\ \Omega$ are connected in parallel. This combination is connected in series with a $4.0\ \Omega$ resistor. What is the overall resistance of this combination?



$$\rightarrow \left(\frac{1}{6} + \frac{1}{12} \right)^{-1} = 4 + 4 = 8\ \Omega$$

4. Three resistors with values of $18\ \Omega$, $26\ \Omega$, $9\ \Omega$, respectively, are connected in series. What is their equivalent resistance?

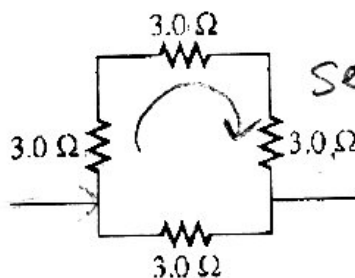
$$53\ \Omega$$

5. Four resistors with values of $15\ \Omega$, $20\ \Omega$, $30\ \Omega$, $60\ \Omega$, respectively, are connected in parallel. What is the overall resistance of this combination?

$$\left(\frac{1}{15} + \frac{1}{20} + \frac{1}{30} + \frac{1}{60} \right)^{-1} = 6\ \Omega$$

6. Two resistors with values of $6.0\ \Omega$ and $12\ \Omega$ are connected in parallel. This combination is connected in series with a $2.0\ \Omega$ resistor and a $24\ \text{V}$ battery. What is the current in the $2.0\ \Omega$ resistor?

$$\left(\frac{1}{6} + \frac{1}{12} \right)^{-1} = 4 + 2 = 6\ \Omega$$



series

$$3 + 3 + 3 = 9\ \Omega$$

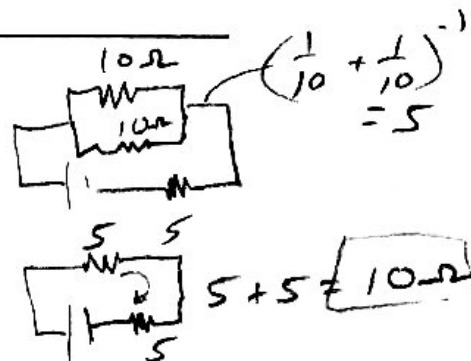
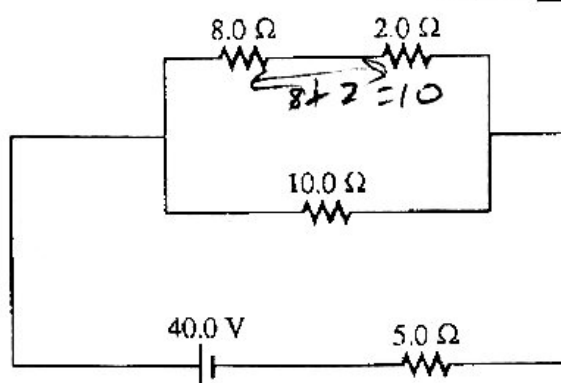
$$\left(\frac{1}{9} + \frac{1}{3} \right)^{-1}$$

$$2.25\ \Omega$$

7. What is the equivalent resistance for the resistors in the figure above?

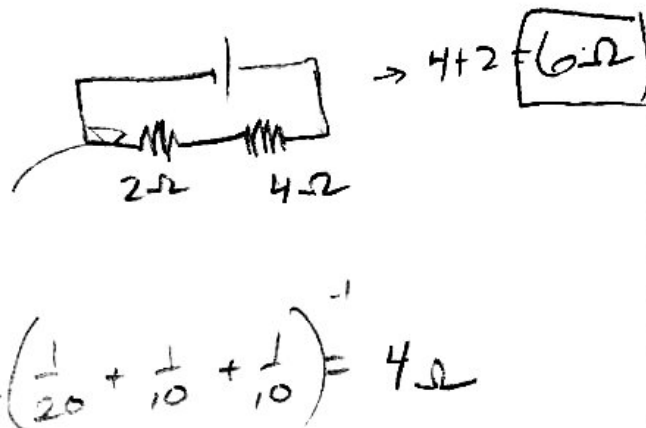
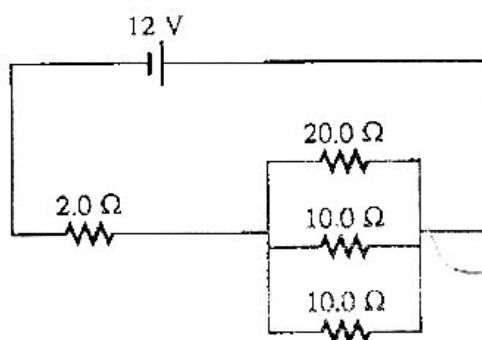
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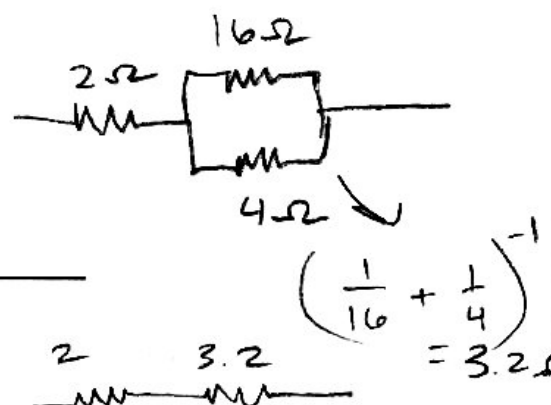
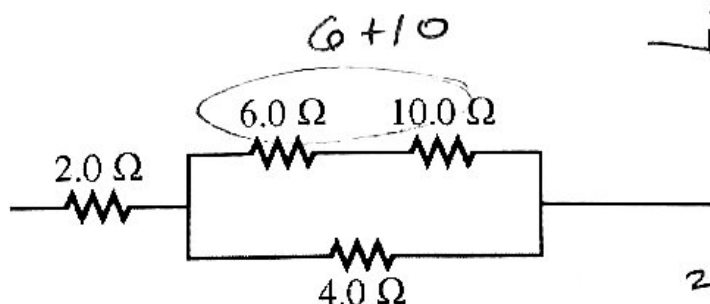
8. For the circuit shown above find the following

- What is the equivalent resistance for the resistors in the figure above?
- What is the total current in the circuit above?



9. For the circuit shown above find the following

- What is the equivalent resistance for the resistors in the figure above?
- What is the total current in the circuit above?

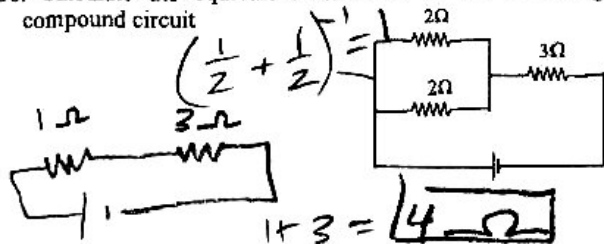


10. For the circuit shown above find the following

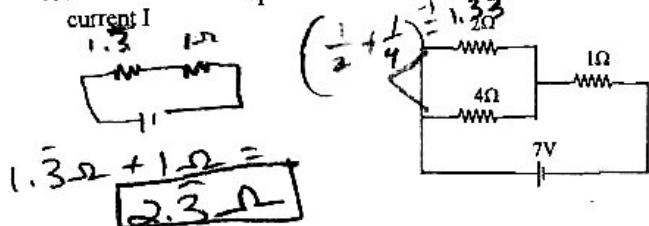
- What is the equivalent resistance for the resistors in the figure above?
- What would the current through the 2 Ω resistor in the figure above if 120V is applied?

$2 + 3.2 = 5.2 \Omega$

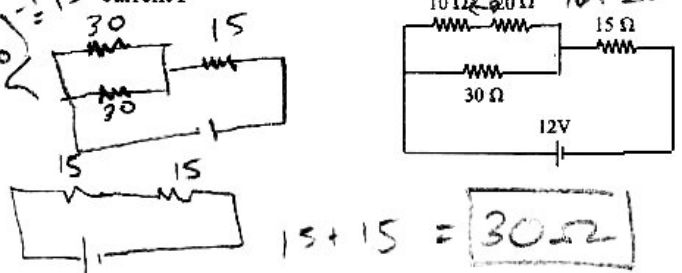
58. Calculate the equivalent resistance of the following compound circuit



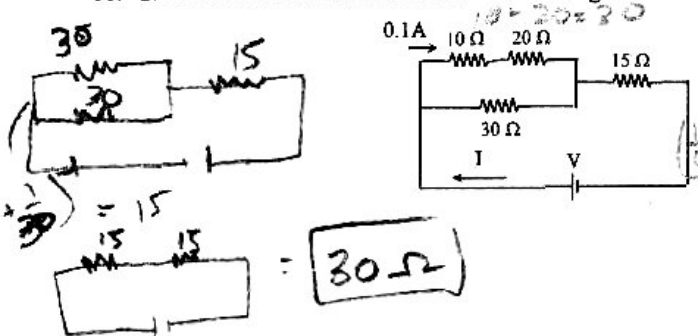
59. Calculate the equivalent resistance R and the total current I



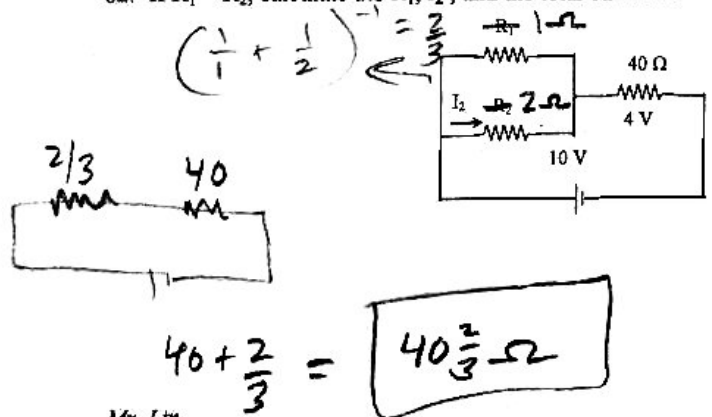
60. Calculate the equivalent resistance R and the total current I



61. Calculate the the total current I and total voltage V

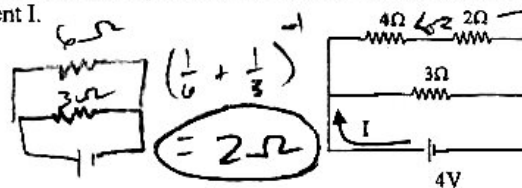


62. If $R_1 = R_2$, calculate the R_1 , I_2 , and the total current I

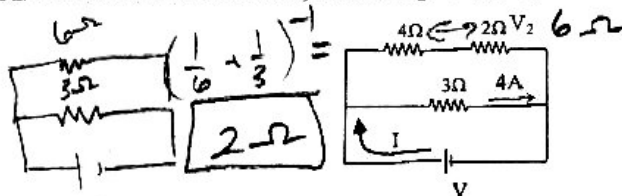


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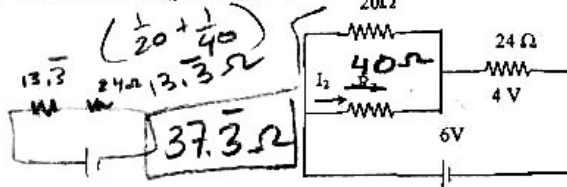
63. Calculate the equivalent resistance R and the total current I



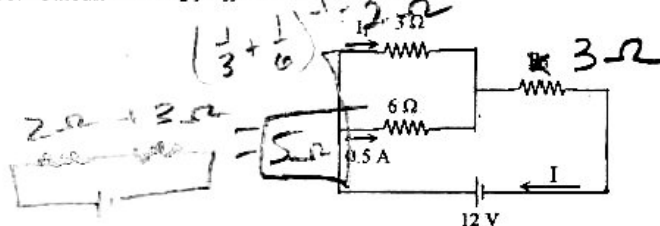
64. Calculate the the total current I , total voltage V and V_2



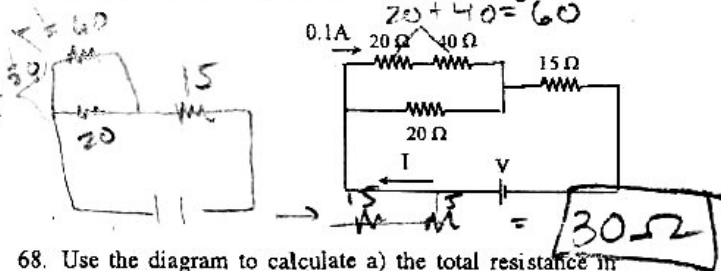
65. Calculate the R_2 , and I_2



66. Calculate the I_2 , R_3 , the total current I



67. Calculate the the total current I and total voltage V



68. Use the diagram to calculate a) the total resistance in the circuit, b) the total current through the circuit, c) the total power the circuit consume, and d) the current through R_2 (where $R_1 = 10 \Omega$, $R_2 = 30 \Omega$, $R_3 = 30 \Omega$, $R_4 = 15 \Omega$, $V = 12V$)

